

## **Coupling VIC with GCM models to predict climate change impact in the Hanjiang basin, China**

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**Abstract** A Smooth Support Vector Machine (SSVM) is proposed for statistical downscaling of daily precipitation and temperature from GCM output. The Variable Infiltration Capacity (VIC) distributed hydrological model with a  $9 \times 9$  km<sup>2</sup> grid resolution is established and calibrated in the Hanjiang basin of China. Validation results show that SSVM can approximate observed precipitation and temperature data reasonably well, and the VIC model can simulate the runoff hydrograph with high model efficiency and low relative error. By applying the SSVM model, the trends of precipitation and temperature projected from CGCM2 under the A2 and B2 scenarios will decrease in the 2020s, and increase in the 2080s. However, in the 2050s, the precipitation will decrease under the A2 scenario and there will be no significant changes under the B2 scenario, but the temperature will be not obviously change under either scenario. Under both scenarios, the impact analysis of runoff made with the downscaled precipitation and temperature time series as input to the VIC distributed model, resulted in a decreasing trend for the 2020s and 2050s, and an overall increasing trend for the 2080s.

**Key words** climate change; statistical downscaling; GCM; SSVM; VIC model; impact study